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PADBANTA	Application Number	10/662,847		
TRANSMITTAL	Filing Date	September 15, 2003		
FORM	First Named Inventor	Alexander J. Roberts		
(to be used for all correspondence after initial filing)	Art Unit	3618		
	Examiner Name	John D. Walters		
Total Number of Pages in This Submission	Attorney Docket Number	GP-302409		

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ENCLOSURES (check all that apply)							
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Response to Missing Parts/ Incomplete Application				•			
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SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT							
Firm <i>or</i> Individual name	Harness, Dickey &	Pierce, P.L.C. Attorney Name Michael D. Wiggins			Reg. No. 34,754		
Signature	Julil &	Hun					
Date	April 3, 2007	0					
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	First Named Inventor	Alexander J. Roberts
ffective 2/8/2006. Patent fees are subject to annual revision.	Examiner Name	John D. Walters

☐ Applicant claims small entity status. See 37 CFR 1.27

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**PATENT** 

Due: April 6, 2007

## IN THE STATES PATENT AND TRADEMARK OFFICE BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Appeal No.	
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Application No.:

10/662,847

Filing Date:

September 15, 2003

Appellant:

Alexander J. Roberts

Group Art Unit:

3618

Examiner:

John D. Walters

Title:

DISPLACEMENT ON DEMAND WITH REGENERATIVE

**BRAKING** 

#### **APPEAL BRIEF**

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Sir:

In support of the Notice of Appeal mailed on February 6, 2007, Appellant respectfully submits the following Appeal Brief.

04/05/2007 SSITHIB1 00000042 070960 10662847 01 FC:1402 500.00 DA

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#### **BRIEF ON APPEAL ON BEHALF OF APPELLANT**

In support of the Notice of Appeal filed on February 6, 2007 appealing the Examiner's Final Rejection of each of claims 1, 3, 5, 6, 8 - 10 and 12 - 16 mailed October 17, 2006, Appellant hereby provides the following remarks. Claims 1, 3, 5, 6, 8 - 10 and 12 - 16 appear in the attached Appendix A.

#### I. REAL PARTY IN INTEREST

The present application is assigned to the General Motors Corporation of Detroit, Michigan by an Assignment recorded on January 6, 2004 at reel/frame 014233/0815.

#### II. RELATED APPEALS AND INTERFERENCES

The undersigned, the Assignee and the Appellant do not know of any appeals or interferences which would directly affect or which would be directly affected by, or have a bearing on, the Board's decision in this Appeal.

#### III. STATUS OF THE CLAIMS

Claims 1, 3, 5, 6, 8-10 and 12-16 are reproduced in the attached Appendix A and are the claims on Appeal. Each of these claims is currently pending in the application.

# IV. STATUS OF ANY AMENDMENTS FILED SUBSEQUENT TO THE FINAL REJECTION

No Amendment has been filed subsequent to the final rejection mailed October 17, 2006.

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#### V. SUMMARY OF THE CLAIMED SUBJECT MATTER

The present application discloses a regenerative braking system for a vehicle 10. In accordance with claim 1, the regenerative braking system includes a displacement on demand (DOD) engine 12 having cylinders 18 and a battery 24 (see Paragraph [0014] and Figure 1). An electric machine 21 includes motor and generator modes and is selectively driven by a wheel 22 of the vehicle 10 (see Paragraph [0015] and Figure 1). A controller 28 detects a braking condition of the vehicle 10 and deactivates at least one of the cylinders 18 while maintaining at least another of the cylinders 18 active in response to the braking condition. The controller 28 operates the electric machine 21 in the generator mode during the braking condition to charge the battery 24 and monitors a vehicle speed (see Paragraph [0018] and Figure 2, Steps 108, 110 and 112). The controller 28 activates at least one of the cylinders 18 when the vehicle speed achieves a threshold (see Paragraph [0020]).

The present application further discloses a method of charging and discharging a battery 24 in a vehicle 10. In accordance with claim 8, the method includes detecting a braking condition of the vehicle 10, deactivating at least one cylinder 18 of an engine 12 in response to the braking condition, while maintaining at least another cylinder 18 of the engine 12 active, and driving an electric machine 21 in a generator mode with a wheel 22 of the vehicle 10 to charge the battery 24 (see Paragraph [0018] and Figure 2, Steps 108, 110 and 112). The method of claim 8 further includes monitoring a vehicle speed and activating at least one of the cylinders 18 when the vehicle speed achieves a threshold (see Paragraph [0020]).

The present application also discloses a method of operating a vehicle 10 having a regenerative braking system. In accordance with claim 13, the method includes detecting a braking condition of the vehicle 10, deactivating a cylinder 18 of an engine 12 in response to the braking condition, while maintaining at least another cylinder 18 of the engine 12 active (see Paragraph [0018] and Figure 2, Steps 108, 110 and 112), and retarding motion of the vehicle 10 by driving an electric machine 21 in a generator mode with a wheel 22 of the vehicle 10 to generate electrical current (see Paragraph [0015] and Figure 1). The method of claim 13 further includes monitoring a vehicle speed and

activating at least one of the cylinders 18 and relieving the retarding when the vehicle speed achieves a threshold (see Paragraph [0020]).

#### VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Appellant seeks the Board's review of the rejection of claims 1, 3, 5 and 6 under 35 U.S.C. § 103(a) as being unpatentable over Tamai et al. (U.S. Pat. No. 6,307,277) in view of Bhavsar (U.S. Pat. No. 6,691,807).

Appellant also seeks the Board's review of the rejection of claims 8 – 10 and 12 – 16 under 35 U.S.C. § 102(b) as being anticipated by, or in the alternative, under 35 U.S.C. § 103(a) as being obvious over Tamai et al. (U.S. Pat. No. 6,307,277) in view of Bhavsar (U.S. Pat. No. 6,691,807).

#### VII. ARGUMENTS

#### A. Claims 1, 3, 5 and 6 under 35 U.S.C. §103(a)

It is initially noted that three basic criteria must be met to establish a *prima facie* case of obviousness. First, there must be some suggestion or motivation to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations (see MPEP §2143).

#### 1. All of the claim limitations are neither taught nor suggested

As discussed above, and in detail in the previously filed responses, claim 1 includes detecting a braking condition of the vehicle, deactivating at least one of the cylinders while maintaining at least another of the cylinders active in response to the braking condition and operating the electric machine in the generator mode during the braking condition to charge the battery. Tamai fails to teach or suggest maintaining at least another of the cylinders active in response to the braking condition.

Tamai discloses a fuel management control system for a traditional hybrid vehicle, wherein the system regulates fuel on/off transitions of the engine upon deceleration of the vehicle (see Col. 2, Lines 38 - 40). Once fuel and spark are cut to all of the cylinders, the engine is kept spinning and transmission downshifts are performed with the aid of an electric machine, until the transmission is dropped to neutral (see Col. 2, Lines 39 - 49). Accordingly, Tamai fails to teach or suggest maintaining at least another of the cylinders active in response to the braking condition.

Bhavsar fails to cure the deficient teachings of Tamai. More specifically, Bhavsar discloses a hybrid vehicle system that is powered by an electric motor 14 and an engine 16, which provide a total torque output to propel the vehicle. A propulsion control 24 calculates the overall <u>drive</u> torque demand partially based on the vehicle speed and determines the percentage of the overall <u>drive</u> torque demand that is to be provided by the electric motor 14 and the percentage that is to be provided by the engine 16 (see Col. 5, Lines 35 - 47).

If the percentage of <u>drive</u> torque that is to be provided by the engine 16 is not achievable using less than all of the cylinders of the engine 16, the engine 16 is

operated using all of the cylinders in an internal combustion engine (ICE) mode (see Col. 5, Lines 60 - 67, and Steps 56 and 60 of Figure 3). If the percentage of <u>drive</u> torque that is to be provided by the engine 16 is achievable using less than all of the cylinders of the engine 16, the engine is operated in the variable displacement engine (VDE) mode, thereby conserving fuel (see Col. 6, Lines 6 - 13, and Steps 56 and 62 of Figure 3).

Accordingly, the control strategy of Bhavsar is intended to split the <u>drive</u> torque requirements between the electric motor and the engine, while preventing the engine from changing between the ICE and VDE modes, thereby inhibiting adverse NVH (see Col. 2, Lines 8 – 11, Col. 6, Lines 24 – 28, and Col. 7, Lines 15 – 19).

Bhavsar is completely silent as to braking of the vehicle, and is specifically silent as to regenerative braking of the vehicle. There is no explicit or implicit discussion of operation of the engine during vehicle braking, other than mentioning the presence of a brake pedal (see Col. 5, Line 3). Moreover, there is specifically no mention of deactivating at least one cylinder in response to a braking condition, maintaining at least another of the cylinders active in response to the braking condition or operating the electric machine in the generator mode during the braking condition to charge the battery within the entire disclosure of Bhavsar.

In view of the foregoing, neither Tamai nor Bhavsar teach or suggest maintaining at least another of the cylinders active in response to a braking condition. Therefore, the prior art references fail to teach or suggest all the claim limitations.

For at least these reasons, it is respectfully requested that the rejection of the independent claims be overturned.

#### 2. The combination of Tamai and Bahvsar is improper

As discussed above, a *prima facie* case of obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so (see *In re Kahn*, 441 F.3d 977, 986, 78 USPQ2d 1329, 1335 (Fed. Cir. 2006)). Furthermore, the mere fact that references can be combined or modified does not render the resultant

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combination obvious unless the prior art also suggests the desirability of the combination (see *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990)).

As discussed above, Tamai is directed to an aggressive fuel management program, whereby fuel flow is <u>completely</u> shut-off the engine (i.e., fuel is cut-off to all cylinders) in response to vehicle braking at vehicle speeds above a predetermined speed and maintaining the <u>complete</u> fuel shut-off during vehicle coasting above a predetermined speed (see Abstract, for example). Bhavsar, on the other hand, is completely silent as to braking of a hybrid vehicle. Instead, the disclosure of Bhavsar is wholly focused on splitting the <u>drive</u> torque (i.e., not braking) requirement between an electric machine and an engine, while operating the engine in a reduced cylinder mode as consistently as possible.

Accordingly, the objective of Tamai conflicts with that of Bhavsar. More specifically, Tamai seeks to cut-off fuel to <u>all of the cylinders during vehicle braking</u>, while Bhavsar cuts-off fuel to only <u>a reduced number of cylinders during vehicle propulsion</u> (e.g., enough cylinders are maintained active to provide the requisite torque from the engine). Therefore, there is no suggestion or motivation provided in either reference to combine the references.

It is further noted that "[i]f [the] proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification." *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984). As discussed above, Tamai is directed to fuel cut-off to all of the cylinders during vehicle braking, while Bhavsar is directed to fuel cut-off fuel to only a reduced number of cylinders during vehicle propulsion. Accordingly, modifying Tamai to include the technical features of Bhavsar would render Tamai unsatisfactory for its intended purpose.

For at least these reasons, it is respectfully requested that the rejection of the independent claims be overturned.

#### 3. Dependent Claims 3, 5 and 6

With regard to dependent claims 3, 5 and 6, these claims are allowable for at least the reasons previously presented with regard to their corresponding independent

claims. In addition, to the extent that they mention further aspects of the regenerative braking apparatus, they are also even additionally allowable over the prior art of record. Accordingly, it is respectfully requested that the rejection of the dependent claims be overturned.

#### B. Claims 8 – 10 and 12 – 16 under 35 U.S.C. §102(b) or §103(a)

#### 1. Independent Claims 8 and 13

When applying 35 U.S.C. §102, it is well established that "[a] claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). It is also well established that "[t]he identical invention must be shown in as complete detail as is contained in the ... claim." *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). It is respectfully noted that the identical invention is not disclosed in Tamai.

Each of claims 8 and 13 include detecting a braking condition of the vehicle, deactivating at least one of the cylinders, while maintaining at least another of the cylinders active in response to the braking condition, and operating the electric machine in the generator mode during the braking condition to charge the battery. Tamai fails to disclose the identical invention. More specifically, and as admitted by the Examiner, Tamai fails to disclose maintaining at least one cylinder active during a braking condition.

For at least these reasons, it is respectfully requested that the rejection of the independent claims under 35 U.S.C. §102 be overturned.

With regard to the rejection of claims 8 and 13 under 35 U.S.C. §103, the above discussion with respect to claim 1 is incorporated herein. More specifically, neither Tamai nor Bhavsar teach or suggest maintaining at least another of the cylinders active in response to a braking condition. Therefore, the prior art references fail to teach or suggest all the claim limitations. Furthermore, there is no suggestion or motivation to combine the references and such a combination would render Tamai unsatisfactory for its intended purpose.

For at least these reasons, it is respectfully requested that the rejection of the independent claims under 35 U.S.C. §103 be overturned.

#### 2. <u>Dependent Claims 9, 10, 12 and 14 – 16</u>

With regard to dependent claims 9, 10, 12 and 14 - 16, these claims are allowable for at least the reasons previously presented with regard to their corresponding independent claims. In addition, to the extent that they mention further aspects of the regenerative braking apparatus and methods, they are also even additionally allowable over the prior art of record. Accordingly, it is respectfully requested that the rejection of the dependent claims be overturned.

#### VIII. CONCLUSION

Appellant respectfully requests the Honorable Board of Patent Appeals and Interferences to reverse the Examiner's obviousness rejection of each of pending claims 1, 3, 5 and 6 under 35 U.S.C. §103(a) over Tamai in view of Bhavsar, and pending claims 8 - 10 and 12 - 16 under 35 U.S.C. § 102(b) as being anticipated by, or in the alternative, under 35 U.S.C. § 103(a) as being obvious over Tamai in view of Bhavsar (U.S. Pat. No. 6,691,807).

Appellant respectfully submits that the prior art does not teach or suggest all of the claimed features. Accordingly, for at least the aforementioned reasons, Appellant respectfully requests the Honorable members of the Board of Patent Appeals and Interferences to reverse the outstanding rejections in connection with the present application and permit each of claims 1, 3, 5, 6, 8 - 10 and 12 - 16 to be passed to allowance in connection with the present application.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Michael D. Wiggins, Reg. No. 34,754 at the telephone number of the undersigned below.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 08-0750 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted.

HARNESS, DICKEY, & PIERCE, P.L.C.

Date: April 3, 2007

Reg. No. 34,754

(248) 641-1600

Please address all correspondence to:

**GENERAL MOTORS CORPORATION** Legal Staff Mail Code 482-C23-B21 P.O. Box 300 Detroit, MI 48265-3000

#### **APPENDIX A**

This is a complete and current listing of the claims, marked with status identifiers in parentheses, as amended in the Amendment filed on August 11, 2006.

1. (Previously Presented) A regenerative braking system for a vehicle, comprising:

a displacement on demand (DOD) engine including cylinders;

a battery;

an electric machine that has motor and generator modes and that is selectively driven by a wheel of said vehicle; and

a controller that detects a braking condition of said vehicle, that deactivates at least one of said cylinders while maintaining at least another of said cylinders active in response to said braking condition, that operates said electric machine in said generator mode during said braking condition to charge said battery, and that monitors a vehicle speed and activates at least one of said cylinders when said vehicle speed achieves a threshold.

#### 2. (Cancelled)

3. (Previously Presented) The regenerative braking system of claim 1 wherein said controller detects termination of said braking condition and activates all of said cylinders in response to said termination.

- 4. (Cancelled)
- 5. (Original) The regenerative braking system of claim 1 wherein said controller selectively operates said electric machine in said motor mode to drive said wheel.
- 6. (Original) The regenerative braking system of claim 1 wherein said controller selectively deactivates all of said cylinders of said engine and operates said electric machine in said motor mode to drive said wheel.
- 7. (Cancelled)
- 8. (Previously Presented) A method of charging and discharging a battery in a vehicle, comprising:

detecting a braking condition of said vehicle;

deactivating at least one cylinder of an engine in response to said braking condition while maintaining at least another cylinder of said engine active;

driving an electric machine in a generator mode with a wheel of said vehicle to charge said battery; and

monitoring a vehicle speed and activating at least one of said cylinders when said vehicle speed achieves a threshold.

9. (Previously Presented) The method of claim 8 further comprising: activating said electric machine in a drive mode to drive said wheel.

- 10. (Original) The method of claim 9 further comprising providing electrical current to said electrical machine from said battery.
- 11. (Cancelled)
- 12. (Previously Presented) The method of claim 8 further comprising: detecting termination of said braking condition; and activating said at least one cylinder in response to said termination.
- 13. (Previously Presented) A method of operating a vehicle having a regenerative braking system, comprising:

detecting a braking condition of said vehicle;

deactivating a cylinder of an engine in response to said braking condition while maintaining at least another cylinder of said engine active;

retarding motion of said vehicle by driving an electric machine in a generator mode with a wheel of said vehicle to generate electrical current;

monitoring a vehicle speed; and

activating at least one of said cylinders and relieving said retarding when said vehicle speed achieves a threshold.

14. (Original) The method of claim 13 further comprising charging a battery with said electrical current.

- 15. (Previously Presented) The method of claim 13 further comprising: activating said electric machine in a drive mode to drive said wheel.
- 16. (Previously Presented) The method of claim 15 further comprising providing electrical current to said electric machine from a battery.

## APPENDIX B

There is no evidence being submitted with this appeal.

### **APPENDIX C**

There are no related proceedings.